

R E M A R K S

Claims 25-47 are now in this application, and are presented for the Examiner's consideration.

Additional Claim Fee

Because there are two additional total claims in excess of 20 claims, an additional claim fee of \$100.00 is required, which is being paid herewith.

Objection to Specification

By this Amendment, applicants have amended the specification to delete the phrase "without mixing a sensitizer" which was objected to under 35 U.S.C. §132(a) because it introduced new matter into the disclosure of the invention.

Thus, although applicants respectfully submit that the indicated phrase may or may not be considered to be new matter to the disclosure, in order to advance the prosecution of the application, this phrase has been deleted from the specification and claims.

Rejection of claims under 35 U.S.C. §112

Claims 25-45 were rejected under 35 U.S.C. §112, first paragraph, on the ground that the phrase "without mixing a

sensitizer" did not appear in the specification as originally filed, and introduces new concepts.

In order for the claims to encompass a process wherein no sensitizer is present in the solution of the 1,4-disubstituted diacetylene polymer being irradiated or heated, applicants have employed the terminology "consisting essentially of" which excludes any other material in the solution which might affect the process.

It is pointed out that the deletion of the language "without mixing a sensitizer" and use of the phrase "consisting essentially of" instead is not an agreement that there is no support in the specification.

Specifically, because mixing a sensitizer is not the obvious or accustomed technical method, a person skilled in the art would inevitably understand that sensitizer is not used in the present invention.

Further, from the present application, it is submitted that the present invention does not include mixing a sensitizer.

Starting at page 7 and continuing therefrom, process steps (1), (2), (3), (4-1) and (4-2) are described.

In the process step (1) starting at page 7, line 4, crystals of monomers of 1,4-di-substituted diacetylene are provided.

In the process step (2) starting at page 7, line 9, the crystals of 1,4-di-substituted diacetylenes described in step (1) are either irradiated at room temperature with 30 to 50 Mrad of

gamma rays from cobalt 60 as the radiation source, or held at a temperature 5 to 10 degrees lower than the melting point, and production of 1,4-di-substituted diacetylene polymers are formed.

Therefore, before the process step (2), there are no sensitizers mixed, because "the crystals of 1,4-di-substituted diacetylenes described in (1)" are either irradiated or held at a certain temperature, and there are no other process steps which include mixing a sensitizer for forming 1,4-di-substituted diacetylene polymers.

In the process step (3) starting at page 7, line 22, the 1,4-di-substituted diacetylene polymer obtained according to the process step (2) is dissolved in a polar solvent, trichloroethane or tetrachloroethane, or dimethylformamide, dimethyl sulfoxide, dimethylacetamide or 1-methyl-2-pyrrolidone to a concentration of 10 to 500 mg/100 ml, and preferably 50 to 200 mg/100 ml to obtain a 1,4-di-substituted diacetylene polymer solution.

A concentration of 10 to 500 mg/100 ml, and preferably 50 to 200 mg/100 ml means that 10 to 500 mg, preferably 50 to 100 mg of 1,4-di-substituted diacetylene polymer obtained according to process step (2) is resolved in 100 ml of polar solvent.

In the process step (4-1) starting at page 7, line 31, a reaction vessel containing a polydiacetylene solution prepared in process step (3) is irradiated with laser light at room temperature to carry out a photodegradation reaction of the polydiacetylene.

In the process step (4-2) starting at page 9, line 26, the polymer can be obtained by placing a 1,4-di-substituted diacetylene polymer solution prepared in process step (3) in a sealed glass tube or glass vessel with a stopper and causing thermal degradation by holding for 30 to 300 minutes in a silicone oil bath heated to a temperature of 100°C to 300°C.

In the process step (4-1) or (4-2), "polydiacetylene solution prepared in (3)" is composed of a composition of 10 to 500 mg, preferably 50 to 100 mg of 1,4-di-substituted diacetylene polymer obtained according to the process step (2) and 100 ml of polar solvent.

Therefore, there are no other materials (including sensitizer), except for 1,4-di-substituted diacetylene polymer obtained according to the process step (2) and a polar solvent.

It is therefore submitted that there is no step for mixing a sensitizer in the process steps (1), (2), (3), (4-1) or (4-2).

In any event, as discussed above, the phrase "without mixing a sensitizer" has been deleted, and in order to advance prosecution, applicants have employed the terminology "consisting essentially of" which excludes any other material in the solution which might affect the process.

Applicants therefore submit that the claims are now in full compliance with the requirements of 35 U.S.C. §112, first paragraph.

Prior Art Rejections

First, applicants respectfully note that in paragraph 2 on page 2 of the Office Action, the rejection of claim 13 (now claim 25) under 35 U.S.C. §102(b) as being anticipated by the Wenz et al reference, has been withdrawn. It is also noted that applicants' arguments concerning the rejection of claims 13-24 under 35 U.S.C. §102(b) as being anticipated by or, in the alternative under 35 U.S.C. §103(a) as being obvious over Leyrer et al were considered as being persuasive for newly amended claims 25, 26 and 45.

The Examiner had further indicated that the rejection was withdrawn because in the case of Wenz et al, this reference fails to teach the specific limitation of irradiating with a laser light having the recited range and average degree of polymerization.

Claims 27-30 and 41-44 were rejected under 35 U.S.C. §102(b) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being obvious from, U.S. Patent No. 4,640,960 to Leyrer et al.

However, applicants respectfully submit that applicants' products are neither identical to or only slightly different from the products of the cited reference.

As applicants had noted in their previous response, while the reference may disclose the process of degradation of 1,4-PDA,

(polydiacetylene), through the process of radiating actinic light or heating, there is an essential difference between the invention of Leyrer et al and the present claimed invention in chemical composition of the reaction mixture. In the reference process, a so-called sensitizer or sensitizing system is present and appears to be an essential feature in the Leyrer et al invention. Such is not the case in the present claimed invention. This difference is quite important for the reason that the degradation mechanism of 1,4 PDA can be regarded to be entirely different for the case with or without a sensitizer. In Leyrer et al, it is necessary to prepare a homogeneous mixture of 1,4 PDA with a sensitizer which can be activated by heat and/or actinic light, etc. to form reactive free radicals, as is described in claim 1 of the reference.

In the examples of the reference, the following sensitizers are set forth in column 4:

Xanthene dyes such as Rhodamine 6G; thiazinium dyes, such as methylene blue; free radical catalysts such as benzoylperoxide, and the like.

Actually, such sensitizers are used in the process of radiating light or heating for reducing the molecular weight of 1,4-PDA in example 1, while no reduction if molecular weight of 1,4-PDA is confirmed without a sensitizer.

Applicants therefore respectfully submit that the use of sensitizers to reduce molecular weight does not suggest that

molecular weight can be reduced without sensitizers, or that the products produced would be the same. One skilled in the art would have no knowledge of the present invention and would expect the products to be different if a sensitizer was or was not employed.

In the Leyrer et al disclosure, degradation of 1,4-PDA is induced via free radical reactions following the attack of activated sensitizers against the PDA molecules. In the present claimed invention, neither sensitizers nor sensitizer systems are employed for the degradation process of 1,4-PDA which is in distinct contrast to the Leyrer et al process. The degradation of 1,4-PDA in the present invention proceeds via direct excitation of 1,4-PDA molecules by laser light without any sensitizer.

The superior feature of the present claimed method is that the pure degradation products of 1,4-PDA can be obtained free from chemical impurities such as sensitizers. The present invention, instead, utilizes laser light of a wavelength within 250 to 1200 nm and degradation is undergone by setting up an irradiation time instead of using or adapting sensitizers. Also, as described in the present application, 30 minutes to 5 hours of heating time and 100 to 300°C temperature are the conditions selected for the thermo degradation. Thus, in the present invention, degradation is undergone by setting heating time instead of using or adapting sensitizers.

In Leyrer et al, the duration of irradiation or heating of the mixture of PDA and sensitizer depends on the type of sensitizer and energy source, as well as other parameters, such as layer thickness as noted in lines 47 to 50 at column 6.

Applicants therefore submit that the products produced by the present invention and those of the reference are polymeric, and not just discreet compositions having well defined chemical structures. Hence, it is submitted that the products obtained by the present claimed process without the use of sensitizers are different from those products prepared by a process which requires the use of sensitizers as an integral component of the process. It is respectfully submitted that the Examiner has not demonstrated in what respects that the products are the same or closely similar.

Further, in accordance with the above discussion, and in order to emphasize the aspects of the present invention, in addition to using the language "consisting essentially of", the independent claims have been amended to recite "irradiating a solution consisting essentially of dissolved 1,4-di-substituted diacetylene polymer in a polar solvent with a concentration of 10 to 500 mg of 1,4-disubstituted diacetylene polymer/100 ml of polar solvent, with laser light having a wavelength within the range of 250 to 1200 nm, to cause a photodegradation reaction of said polymer." This language is clearly supported in the specification.

Therefore, even if the Examiner maintains the position that there is no support for the language of "without mixing a sensitizer", it is submitted that the above amendment to the independent claims corresponds to a limitation of construction in which the solution is composed merely of 1,4-disubstituted diacetylene polymer/100 ml and polar solvent, and other materials (including sensitizer) are not mixed.

Applicants therefore submit that Leyrer et al does not anticipate or render obvious the present invention, and withdrawal of the rejection is therefore respectfully requested.

Accordingly, it is respectfully submitted that the rejection of claims 27-30 and 41-44 under 35 U.S.C. §103(a) has been overcome, and withdrawal of the rejection is therefore respectfully requested.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

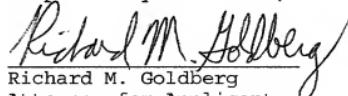
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The Commissioner is authorized to charge any additional fees
which may be required, or credit any overpayment to Deposit
Account No. 07-1524.

In view of the foregoing amendments and remarks, it is
respectfully submitted that Claims 25-47 are all allowable, and
early and favorable consideration thereof is solicited.

Respectfully submitted,


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